The Citrus Industry

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Vol. 29, No. 67 July, 1948

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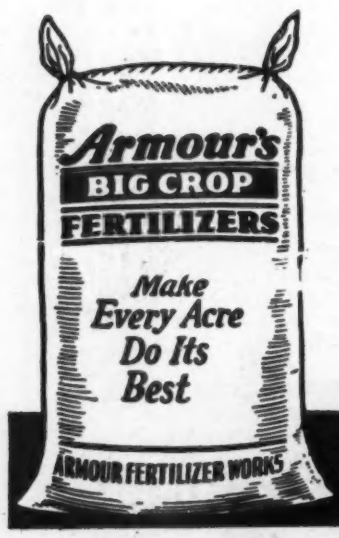

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The Complete Utilization Of Citrus Crops

By
J. L. HEID

(Concluded from last month)

Methods for Utilizing Citrus Fruits

From these illustrations it is apparent that problems of the citrus industry call for talents of Chemurgists to increase profitable utilization of this crop. The presence of an unconsumed surplus tends to have a depressing influence upon the market for any crop and its products. The citrus industry must turn toward more diversified and complete utilization as one means for stabilizing the sale of fruit. It is proposed to outline established, promising and desireable channels for utilizing oranges and grapefruit in foods, feeds and industrial products.

A constructive program must consider improvement of established products and the development of new products.

Canned juices account for the largest volume of processed oranges and grapefruit. Quality has been improved so that it is possible to retain all Vitamin C by proper canning methods which involve: proper selection, cleaning and rapid handling of the fruit, extracting, screening, de-aerating, flash heating and filling rapidly and uniformly, under sanitary conditions out of contact with injurious substances such as copper alloys, iron or zinc. Freshly canned juice has a very fine flavor which deteriorates if the product is stored at high temperatures.

To lengthen shelf life and increase acceptability of this product the next logical advances will include: (1) cooling cans 20° F. cooler before casing, (2) maintaining storage warehouse temperatures as cool as possible, never to exceed 80° F., and (3) injecting a trace of carbon dioxide into each can before closing.

Concentrated juices account for a considerable volume of fruit and have been improved in flavor and food value by factors which have helped canned juice, plus developments in equipment to provide for continuous production in multiple-stage evaporators operating either at very low temperatures and pressures or for very short periods. Minimum time of retention, maximum agitation and velocity and close control of heating and cooling operations have made it possible to produce excellent quality products which are widely used in Europe and in the School Lunch Program in this country. Much needed revisions in standards promise improvements in commercial products.

The latest development in concentrated citrus juices is an unpasteurized frozen concentrate which repeatedly, in blindfold tests in the heart of the citrus area, has been preferred three to one over freshly squeezed juice.

In the process operated by the Florida Citrus Canners Cooperative the following procedure is followed. (1) Selected, premium-grade fruit is blended to insure uniformity, (2) The fruit is handled from trees to extractors within 48 hours, (3) After sorting and washing to sterilize fruit surfaces, juice is extracted in a plant subjected to hourly bacteriological checks to insure sanitation, (4) Juice is separated into 92 per cent screened juice and 8 per cent pulpy juice, (5) The screened juice is de-aerated, chilled and introduced to a continuous, three-stage, falling-film evaporator, (6) Soluble solids are increased to 60 per cent in four minutes by evaporation at 50 to 60° F., condensing compressed ammonia to supply latent heat of evaporation and evaporating expanded ammonia to condense vapor from the juice, (7) The 69° Brix concentrate is pumped continuously to insulated, ammonia-jacketed tanks where it is simultaneously chilled to 26° F. while being mixed with the pulpy, single strength juice, (8) The resulting concentrate is standardised at 42° Brix and slush frozen to 16° F. through a Votator, (9) It is filled in cans, which are vacuum sealed, and is then hardened on ammonia coils before casing, (10) It is stored and distributed at 0° F.

As a result of this process and these precautions, it is possible to deliver to home and institutional

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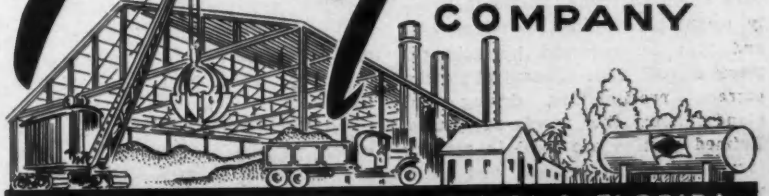
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users products which resemble freshly squeezed juice from newly picked fruit.

Startling demonstrations have been made of the superior flavor of this product. Blindfold tests were conducted at the Roger Babson annual Business Conferenee and at Dick Pope's Cypress Gardens Water Ski Tournament. Here in the heart of the citrus area, at the peak of the season, reconstituted frozen concentrate was tested against the freshly squeezed juice of selected oranges.

At the business conference tasters preferred the reconstituted frozen concentrate 80 to 32. The water skiers, from all parts of the country, also favored the frozen product in a ratio of 3 to 1. Reasons for this superiority are that the product is prepared from selected and blended fruit, harvested at its peak of ripeness, rushed to the processing plant without delay, and handled through the plant by methods that cannot be easily duplicated.

A commercial advantage is that the higher cost of frozen concentrate is largely offset by the 75% saving of container, shipping and storage costs permited by concentration. An additional advantage of concentration is that it makes defrosting quick, easy and almost fool-proof. The frozen concentrate chills the water, the water melts the frozen concentrate and the reconstituted juice is chilled and ready to serve without delay. This overcomes the great objection to frozen single strength juice that it has always been difficult to defrost it without ruining the flavor.

Powdered juice can be made by evaporating or subliming moisture from citrus juices exposed under high vacuum on trays, drums, belts, or in the form of a spray. Products containing large portions of spreading agents are easy to make, but the cost of making powders containing little or no filler (for use in making reconstituted juice) is high. The product is bulky and hygroscopic and the market is correspondingly limited.

Beverage bases, marmalades, preserves, jellies, candies and similar products represent other direct food uses of citrus fruits. Pectin is loosely bound to cellulose in citrus peel and may be recoverd by acid extraction (pH 2.2), concentrating the extract, precipitating, drying and standardizing the powdered pectin. Refined pectins are used in making jams and jellies, cheese and sandwich spreads, in internal and external medicines and in blood plasma substitutes. Crude pectin and pectin pomace products find a wide variety of uses including the tempering of steel. Low methoxy-pectins can be made into powders for use with fruit juice, milk, or water.

In oranges and grapefruit peel there is an essential oil containing waxes, resins, aldehydes, esters and limonene. This essence is recovered by a variety of processes; and various grades are used in flavors, perfumes, beverage bases, paints and as raw materials for the synthesis of an increasing number of products, including insecticides.

Fixed oils, glycerides of oleice, palmitic, stearic, lineoleic and arachidic acids, can be recovered commercially from grapefruit and orange seeds, and after refining are suitable for food or industrial applications. The press cake can be used as a protein feed especially valuable for hogs, or can be recombined with the balance of the dried citrus pulp to raise protein content.

Juice pressed from cannery residues can be used to prepare a bland syrup by subjecting it to ion-exchange processes. Citric acid and ascorbic acids can be recovered, by processes which are adapted for this purpose. Pressed juices and other dilute wastes can be subjected to fermentation processes to yield feed yeast, citric, lactic and acetic acids and alcohol. It can also be used in the preparation of anti-biotics.

Williams at Texas University has shown that grapefruit is one of the richest sources of **Inositol**, which affects the health of livers of men and animals. Scarborough in England has demonstrated that grapefruit is high in **Vitamin P.** Citrus products consumed by man and animals are rich in these substances and it is possible that the recovery of concentrated or purified materials from grapefruit might be built into a profitable commercial enterprise. Research is needed before possibilities can be evaluated.

Many products can be made from citrus fruits and residues and it is possible to operate citrus products plants to completely utilize every part of the fruit.

As has been indicated, the immediate problem of increasing the utilization of grapefruit invites special consideration of the value of this fruit as a feed for beef and dairy cows. Suggestions range from converting grapefruit groves into cattle pastures, down to proposals that Cooperative Processors put in feed pens to convert residues directly into beef without drying, sacking, selling and shipping the dried pulp. This proposal has the merit that it would increase meat supplies while demonstrating the value and economy of grapefruit residue as a feed. Chopped fresh fruit and cannery residues, mixed with equal quantities of hay in trench or tower silos, will produce excellent ensilage which is relished and utilized by beef and dairy cows.

Fertilizers can be made from ground citrus residues chemically by allowing them to react with calcium cyanamide or biologically by aerobic fermentation of the lime-neutralized residues or by anaerobic fermentation in tightly closed cells. These processes are salvage, as no profitable commercial operation is known.

The disposal of effluents from citrus fruit processing need not involve insurmountable obstacles or excessive expense unless a plant location is hopeless.

On three occasions your speaker has observed difficulties eliminated after odor nuisances reached a critical state. In each instance, the problem yielded to keeping wastes segregated and handling each appropriately. Processing wastes may be classified as:

1. Cooling and condensing waters which are used once or may be recirculated. Kept free from contamination, these represent no disposal problem and may be valuable for diluting other effluents provided they are kept separated until the proper stage is reached.

2. The effluent from toilets must be kept separated and disposed of in city sewers or septic tanks or treated by other methods for rendering them innocuous.

3. Press Liquor and other rich wastes may be converted into feed yeast or alcohol, or may be concentrated in multiple effect evaporators to make feed molasses. There are few locations where this liquid can be disposed of as sewage without creating a nuisance.

4. The problem which challenges the industry is how to handle dilute floor wastes resulting from dripping of equipment and from clean-up operations. This ordinarily averages 0.7 to 1.7 per cent soluble solids. Methane fermentation is being investigated as a means of producing fuel and reducing the B.O.D. of this type of effluent. A simple method for rendering it innocuous is to screen it (to separate suspended material) and then ferment it as completely as possible, desludge it to separate

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The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
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Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

The Role of Citrus In The Story of Vitamin P...

By Boris Sokoloff, M. D., Ph. D., Asscciate Director, Citrus Research Laboratory, and James B. Redd, Ph. D., Director Citrus School, Florida Southern College, Lakeland, Florida

More than sixty years ago an Italian physician made a sensational announcement. In 1882, Dr. Carlo Maglieri, associated with the University of Naples, Italy, declared that lemon and orange peel contains a quinine-like substance. At that time Southern Italy was devastated by malarial fever. Thousands of persons died from a most violent form of malaria. Quinine was expensive and not always available. Dr. Maglieri began to treat malarial patients with an extract of lemon and orange peel prepared by himself. From all over Italy patients came to him for treatment. He claimed that lemon peel extract had an effect similar to quinine. It reduced the fever and it shortened the crisis.

The work of Maglieri is forgotten. Long ago it was established that there is no quinine or quinine-like substance in lemon peel and that the Italian practitioner had made a pardonable mistake. For the substances which are present in citrus peel are of the same bitter taste as quinine. They are known as glucosides. They have no therapeutic effect on malaria, and yet some of them possess medical activity. Some of them possess vitamin-like action. They are essential for the normal functioning of small blood vessels and capillaries. And indirectly they might help in the treatment of high blood pressure and many other ailments where the small blood vessels of the human body are affected. The story of Vitamin P, a substance which is present in citrus peel and juice, is not yet finished for much confusion still exists as to the chemical nature of Vitamin P. Yet we know a good deal about this intriguing substance which is so much in demand by the medical profession and which is still not available in any substantial amount to the public.

There is a similarity in the story of Vitamin P and that of penicillin. In both cases there was a long road from the moment of the initial discovery to the pracitcal application for therapeutic use.

What Is Vitamin P?

It was in 1936 that Dr. A. Szent-Gyorgyi, a Hungarian scientist of repute, announced his discovery of Vitamin P extracted from lemon peel. It was not a single pure substance that Szent- Gyorgyi discovered. His extract was of a complex nature, it was a crude extract which contained at least two different substances which he called "citrin" and "eriodictin". Yet even these two substances, as was later reported by other scientists, were not pure substances.

An intensive clinical investigation at Budapest University followed the discovery by Szent-Gyorgyi. His associate, Dr. L. Armentano, demonstrated that the injection of citrin caused a reduction of blood pressure, while "eriodictin" improved the functioning of small blood vessels.

At first the factor discovered in lemon peel was named vitamin P, the letter P for Permeability of small blood vessels. But, as Dr. Ralph H. Highy points out, it appears that there are actually two vitamins in citrus peel: Vitamin P, which improves the function of small blood vessels, and another vitamin which acts as a blood pressure reducing factor. This vitamin has not as yet any name and its chemical nature is still under discussion and investigation. However, one fact seems to be firmly established: **citrus peel contains valuable medicinal substances.**

The discovery of Szent-Gyorgyi stirred general interest in this new vitamin. And during the past ten years many laboratories both here and abroad have been engaged in research on Vitamin P. More than 600 papers have been published about this substance. Much know-

ledge has been accumulated during these years but the practical solution for the production of a potent vitamin preparation on a large scale has not yet been found. To many physicians such slow progress seems incomprehensible. Even more so is the layman perplexed. The answer to this scientific puzzle lies in the complexity of the chemical nature of Vitamin P.

There is a group of substances in plants known as glucosides. It is with the glucosides that the scientists must deal in their search for vitamin P and in their attempts to isolate this vitamin in pure form. Glucosides play an important role in the life of a plant. This was known long ago. But only gradually was it learned that these substances serve as "reserve energy" for the plant. They are mobilized in case of urgency, as a powerful metabolic factor. They possess a great physical activity. When the plant—a citrus plant or some other plant—is affected by some poisonous substance or suffers from nutritional deficiency, it is the task of the glucosides to protect the tissues and cells from the harmful influence. They are in a sense the "protectors" of the plant, the regulators of the plant metabolism. No wonder that the vitamin P factors were among these substances, so called flavones and flavonones glucosides.

The best known flavonone glucoside is hesperidin. It occurs in most varieties of citrus fruit. It was discovered more than a century ago by Lebreton (1828). But it was only after the discovery of vitamin P that hesperidin was linked to this vitamin. It is present in considerable amounts in orange peel.

Dr. J. B. Redd and Dr. Boris Sokoloff

The dry peel of mandarin oranges contains 5.68% of hesperidin, its imbedded fiber slightly less: 5.24%; dry endocarp only 1.10%. And strange as it may seem the juice has only a trace. Is hesperidin vitamin P? Such an assumption has been held in the past. But soon it was discovered that hesperidin as such, as it is found in citrus fruit, is inactive. It is insoluble in water. And being so it is poorly if at all assimilated by the human organism. But some of the derivatives of hesperidin that are soluble in water show some vitamin P properties.

They have what we call medicinal properties. A purified hesperidin produces no therapeutic effect, but crude orange hesperidin is able to lower blood pressure according to the scientists of the University of Southern California Medical School. A lemon peel infusion has a marked vitamin P activity. Lemon peel infusion prepared by the California Fruit Growers Exchange contains vitamin P factors to a moderate degree (about 30 milligrams per gram of the material) but their pure Hesperidin Methyl Chalcone is much less active as far as vitamin P is concerned. All efforts made by scientists to isolate the pure factor of vitamin P from citrus fruit has failed so far. And almost in despair some physicians and in fact the American Medical Association advises patients to prepare an infusion of citrus peel themselves and give the receipe for such a preparation.

When Szent-Gyorgyi made his discovery the question of vitamin P appeared to him as solved. Had he not obtained vitamin P in crystalline form? But as was soon proved, the crystalline material of Szent-Gyorgyi was not pure or uniform. It consisted actually of three different substances: the glucoside hesperidin, glucoside eriodictyol and glucoside quercitrin. But that was only the beginning of a very complicated story for it was soon demonstrated that all these three substances are closely interelated and glucoside eriodictyol, the active element of citrus fruit, is formed from hesperidin by some chemical change (demethylation) during the ripening of citrus fruit. Green citrus fruit contains chiefly an inactive form of glucoside but with the ripening of the fruit there appears an active glucoside which shows vitamin P properties. The citric acid and ascorbic acid content of the citrus fruit has no bearing upon its vitamin P potency. **The experiments conducted in this laboratory have shown that overmature orange and grapefruit possess almost three times more vitamin P than immature citrus fruit.**

This fact is greatly responsible for the difficulties in obtaining from citrus peel a uniform, if not pure, vitamin P product. When we extract vitamin P material from the citrus pulp of immature fruit—the yield will consist mostly of inactive glucosides which show little if any vitamin P activity. But if instead

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Observations On Cover Crops In The Citrus Program...

Fred P. Lawrence
at Brooksville Citrus Institute

The problem of reducing production costs to cope with fruit prices is the number one question confronting the citrus grower today. It is doubtful that anyone has a complete answer to this question, but a sound appraisal of the known facts looks encouraging. A careful examination of the records indicates that the average grower is following wasteful and unnecessary practices, and that he can materially reduce production costs by eliminating these wasteful practices. That this can be done has been confirmed by many successful growers.

We know from the grower records, compiled by Zach Savage of our Experiment Station, that the average cost for producing a box of fruit was 52c in 44-45, 50c in 45-46, 54c in 46-47 and the indications are that it will be about the same again this year. With present fruit prices it is necessary to reduce the cost of production in order for the grower to stay in business.

At this point I say to you—don't go away from here with the idea that I feel the salvation of the citrus industry lies solely in better production practices. I do not believe this. Our troubles are many and we will not solve them all for several years, but while this is happening there are some things we as growers can do that will help.

Take this 54c per box it is costing us to produce a box of fruit and break it down. We have the following:

1. Labor and equipment	$ .25
2. Fertilizer and amendments	.20
3. Spray and dust	.04
4. Miscellaneous	.05
Total	$ .54

What then are our two big items? They are labor and fertilizer. Can we reduce them further without harmful results? I think possibly we can. I say to you we must.

I belive in three fundamental factors that, to me, are basic in the economical production of citrus fruits. I will list them with a brief statement and then for the remainder of my time I will confine myself to the discussion of only the one—cover crops.

1. I believe in a correct pH balance—I belive that there is an optimum range wherein nutrient elements go into solution and when you alter this range you of necessity have to add larger quantities of the various elements to overcome this out of balance condition.
2. I believe in minimum cultivation—with our sandy soils, so long as the soil is not root or sod bound, there is little profit gained by tillage operations other than that for weed control during critical periods.
3. I believe in adequate cover crops.

When a large number of citrus groves are examined, it will be found that the groves which have made the best growth and look the best are the ones that have received the most careful attention. Usually these groves are the ones in which cover crops have been grown almost continuously. Why is this?

The changes that are constantly taking place in the soil may be grouped as, physical, chemical, and biological. The first relates to movement of water. The second, includes all changes brought by the action of acids or other disintegrators of a chemical nature, while the third, in its use here, refers to changes brought about by soil bacteria. All three changes, whether physical, chemical or biological, are immediately associated with the presence of humus in the soil.

Soil organic matter or humus may be supplied through the purchase of such organic plant foods as dried blood, castor pomace, tankage, bone meal and many others. These are good materials but the available supply is limited in some cases and the cost is high in all. Florida growers today are in no position to use high priced materials if lower priced ones will do the job equally as well—or even nearly so well. Low cost organic matter is obtainable in groves simply by the use of an adequate system of cover crop production.

The advantages of cover crops hardly need to be explained to the grower, any more since most growers know that cover crops help their groves. Nevertheless, cover crops have about seven good points for soil improvement, and I would like to list them and take the time to explain and discuss one or two of the more important ones. I will list them first and then discuss them.

1. Cover crops produce organic matter which increases water-holding capacity of the soil.
2. Cover crops produce humus which increases the soil's base exchange capacity.
3. Cover crops increase the buffer capacity of the soil.
4. Cover crops retard erosion. Prevent rapid run-off.
5. Cover crops add beneficial bacteria. It affords them a source of development.
6. Cover crops help maintain high humidity.
7. Cover crops help eliminate excessive water.

Now to discuss them: Cover crops produce organic matter — organic matter increases the water-holding capacity of soils. We know from experiments performed at Gainesville that when 5% of organic matter is added to coarse sand, the water-holding capacity is increased 40%. Likewise when 10% is added it increased to 85.7%.

Cover crops produce humus which increases the soils' base exchange capacity. Many of the fertilizers applied to groves must undergo certain changes before they can become available. This change from an unavailable to an available state is dependent either upon the action of soil bacteria or chemical agents. Humus forms the media in which the bacteria work and, furthermore, it holds the plant food when in solution until the roots have a chance to use it. The best and fullest effects cannot be secured from commercial fertilizers unless the soils be plentifully supplied with humus.

Cover crops help to maintain a high humidity in groves and is

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Paper Bags Designed For Citrus Shipments...

The Packaging Division of St. Regis Paper Company announces its entry into the citrus field with a specially designed multiwall paper bag and mechanical packer.

The new system for the commercial packing of oranges and grapefruit, which has emerged from two years of successful development work, tests and experiments, has been designed by St. Regis to cut packaging costs, reduce fruit spoilage and shrinkage, eliminate refrigeration and permit easier handling.

Called the Citrobag, the new chemically-treated multiwall bag developed by St. Regis for the shipment of citrus fruit is made up of four plies of kraft paper. It has a capacity of approximately 45 pounds, or half that of the traditional box.

The inner wall of the Citrobag is a chemically-treated kraft paper, which, experiments have revealed, successfully prevents deterioration and substantially reduces shrinkage in the fruit. Next comes a ply of paper specially-treated to hold the chemical vapor within the closed space.

The two outside sheets are made of a wet strength paper, treated with a compound that resists the effect of citrus juices. Experiments have revealed that citrus juice broke down ordinary wet strength paper.

Following a packing demonstration recently before a group of representative citrus shippers at the packing house of the Waverly Citrus Growers Cooperative, Waverly, Fla., Kenneth D. Lozier, vice president of St. Regis Sales Corporation, in the ccurse of a presentation made a detailed analysis of citrus shipping costs. He advanced figures showing that through utilization of the new St. Regis automatic packer designed for citrus packing and the new Citrobag there could be effected a saving of approximately $175 per car of fruit, when compared with present packaging methods.

In the important matter of fruit shrinkage, Mr. Lozier reported the results of several tests which revealed that in a two-week period oranges packed in a Citrobag suffered a shrinkage loss of 2.45%, as compared with a 7.48% loss in oranges packed in containers where air had access to the fruit.

The new bag eliminates the need for refrigeration both in plant and in transit, which contributes importantly to the savings which may be effected by the use of the multiwall bag.

The use of the Citrobag and the St. Regis automatic packer will modernize the packaging operation in the citrus industry. It will, stated Mr. Lozier, speed output and streamline production. It will also assure sanitary packaging, because it is the only completely closed container available to the citrus shipper.

During the past two years shipments in the Citrobag have been made from the Waverly pack house to chain store outlets in North and South Carolina, Pennsylvania, New Jersey and New York, both in straight carloads and truck loads. Recently one large chain in the east specifically requested additional cars of citrus packed in paper.

For the customers of the shippers, said Mr. Lozier, the new Citrobag simplifies used container disposal, reduces fruit shrinkage, assures better appearing fruit, provides easier handling and keeps the fruit clean.

Two years of experimental work in storage tests and carload shipments have satisfied the company, according to Mr. Lozier, that there is now available to the citrus industry a packaging system which offers the grower and shipper an important opportunity to broaden their market and improve their competitive position.

St. Regis' new citrus bag is the latest development in a long series which has proved the versatility of the multiwall paper bag. The first major market for the multiwall bag was the cement industry, which has used substantially more than three billion bags since this type of packaging was introduced less than a quarter of a century ago. Since then, the multiwall bag has become a widely used container for sugar, flour, feeds, chemicals, fertilizers and many other commodities. All in all, some 400 commodities are now being packaged industrially in multiwall paper bags.

Of the approximately 1,600,000,000 multiwall paper bags manufactured in the United States last year, about 600,000,000 were produced by St. Regis.

Filling the New Paper Bags With Citrus Fruits

NORMAL CITRUS CROP

Despite the storm last fall, Lee County's citrus crop appears to be normal, according to County Agent C. P. Heuck. Growers are reducing their operating costs as much as possible to meet lower fruit prices.

Resistance Of Poncirus Trifoliata Rootstock To Nematode Infestation In Argentina...

By Ernest P. DuCharme (Plant Pathologist, Florida State Plant Board and the University of Florida, Citrus Experiment Station, Lake Alfred, Florida)

In the course of studies on the tristeza disease of citrus in Argentina, a study was made of the nematode infestation of citrus trees on various rootstocks. This study was initiated because some of the technical workers in Argentina were of the opinion at that time that the disease might be caused by nematodes or at least the severity affected by the nematode infestation. Since that time it has been established that tristeza is caused by a virus, but so much interest has developed in Florida and California in connection with nematode damage that some of the information derived may be of peculiar interest.

Ingestations of the citrus nematode (Tylenchulus semipenetrans, Cobb) appear to be about universal in the citrus areas around Concordia, Entre Rios, Argentina and in fact only one grove was found free of them and this was a grove planted on new soil with nursery trees grown on the same soil. In many nurseries the young trees were found infested and in new plantings there seems to be a practically universal infestation regardless of whether the planting is on soil formerly planted to citrus or on new land. Extensive examinations were made in groves on mixed stocks to see whether sour orange stock which is the stock associated with the occurrence of tristeza might be more heavily infested than other stocks, but no variations in infestation developed except in the case of Poncitrus trifoliata, (Linn.) Raf. which appears to be highly resistant to nematode infestation though not immune under Argentine conditions. Other stocks including sweet orange, rough lemon, Rangpur lime, Lima de Persia (sweet lime), grapefruit, mandarin and the common type of lime which corresponds to our key lime were all found to be about as heavily infested as sour orange while only a few male nematodes were found assosiated with the roots of trees on Poncirus trifoliata and no females. Since all of the examinations were in groves in which P. trifoliata was mixed with other stocks which were heavily infested it would appear that there is a high degree of resistance in this stock to the citrus nematode. Typical data are given in the table below for the common stocks, and it will be noted that while trees on sour orange, sweet orange, or rough lemon showed about 90 percent infestation the trees on P. trifoliata showed only 34 percent infestation and all of the infesstations were light and no females were found. The table has been compiled without a listing as to the type of scion involved since the top does not appear to have

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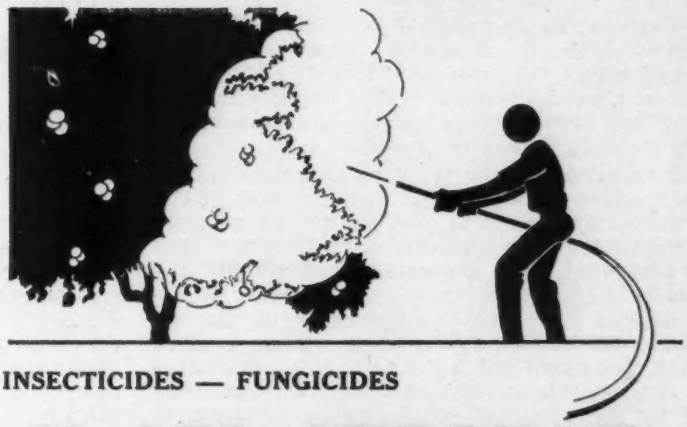

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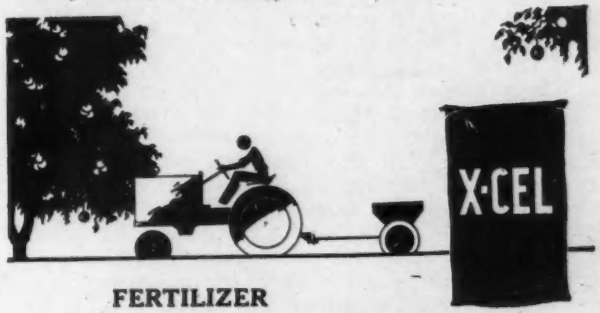

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Publication Office 550 North Broadway, Bartow, Florida
Telephone ---------- 269

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GROWERS IN CONTROL OF FLORIDA CITRUS MUTUAL

Under a new and revised set-up of the Florida Citrus Mutual, statewide super-cooperative organization, the growers of Florida citrus fruits are in absolute control of the organization — it is their organization now, to be conducted as the growers themselves see fit.

Membership in the Mutual under the new set-up is confined to growers, and directors of the organization are to be elected by the growers from among their own members. Members may or may not be also shippers or canners, but primarily they must be growers. Whatever objections may have been expressed about the original plan of the organization appear to have been eliminated under the new set-up, and those in charge of the membership drive are encouraged by the apparent willingness of growers to accept the revised plan and sign up with the organization.

In Polk County, which produces one-third of the citrus fruit of the entire state, a countywide mass meeting and barbecue is scheduled for Winter Haven on June 30. Other counties are making similar efforts to get the growers together and sign up the requisite seventy-five per cent of the state tonnage necessary to put the Mutual into active and aggressive operation.

As the one apparent promise of bringing the citrus industry of Florida out of the "red" and putting it on a paying basis, it should not be impossible to secure the necessary tonnage in short order — indeed, that should be classed as a certainty. Heretofore many growers have felt and declared that any organization proposed was in the interest of others than the growers themselves. No such objection can be urged against the Mutual as now organized under the revised set-up. It is a grower organization pure and simple. It is up to the growers to unite behind the organization and put it over. Its success or failure is in the hands of the growers — if it fails, it will be because of grower inactivity and a spirit of "let George do it." That attitude has spelled the failure of other efforts to bring all factors of the industry into united action. That spirit should not be permitted to wreck the Mutual with its promise of direct benefit to the Growers.

With the record of the past two seasons fresh in their minds, it is unthinkable that growers should fail to give their support to the Mutual under its new set-up. With fruit selling for much below the cost of production; with grove owners making every effort to cut down the cost of production, it is inconceivable that they will fail to join hands in an organizaton which holds out the promise, and apparently the only present hope, of putting the industry on a sound and paying basis.

As the Citrus Industry Magazine views the situation, it cannot believe that Florida citrus growers will permit this opportunity to go by without putting forth the utmost effort to see that the necessary tonnage is signed up in time for the Mutual to begin functioning before the opening of the next shipping season. The officers of the organization and the heads of the membership drive are doing their part. It is up to the growers to do their part. We believe that they will do it.

GRAPEFRUIT GROWERS OPERATE AT LOSS

A recent report of the Florida State Marketing Bureau states that Florida grapefruit growers during the season just closing have operated at a loss of ten cents per box.

Stating that the average cost of producing a box of grapefruit is 37 cents, the Bureau goes on to show that the average return to the growers, taking in all sections of the state and all seasons of the marketing period, was 27 cents. Of course, some few growers may have produced their fruit at less than 37 cents per box; on the other hand, many found that it cost them more. Then, too, some growers may have received more than 27 cents for some of their fruit, but many more received much less. Taken all in all, the figures announced by the Marketing Bureau may be taken as being at least fairly accurate.

It is very evident that Florida grapefruit growers cannot go on indefinitely producing fruit at a loss. They must find a way to produce at a profit or go out of business. Most growers have already reduced the cost of production to the lowest possible point without injury to the trees. The only other course possible in changing from a loss to a profit lies in the increase of the on-tree price of fruit. This can be accomplished only through organization — organization which can control marketing, distribution and elimination of inferior fruit from the market. That most growers realize this and are ready to join hands in such an organization seems to be apparent.

NO OPEN HEARING ON QUALITY

The United States Department of Agriculture has rejected a suggestion that the recent action of the Florida Citrus Commission raising the test on interior quality of citrus fruits be submitted to a public hearing. The hearing had been asked at the request of objectors to the newly enacted standards. The department has not formally approved the new tests, but its refusal to approve an open hearing is accepted as a favorable sign by supporters of the new standards.

THE ROLE OF CITRUS IN THE STORY OF VITAMIN P

(Continued from page 6)

we shall take the pulp from overmature citrus fruit, those fruits which might have a low citric acid content and are not used for canning purposes as a fruit, such a pulp would yield glucosides showing high vitamin P activity. **It is precisely the citrus fruit which is thrown away because of over-maturity that is the richest source of vitamin P.**

Rutin a Challenge to Citrus Vitamin P

While the scientists and the citrus industry were struggling for the isolation of vitamin P from citrus pulp achieving a very moderate success in their investigations, an isolation of vitamin P-like substance from buckwheat was announced. Two years ago Dr. J. F. Couch and his associates of Eastern Regional Laboratory, U. S. Deparment of Agriculture, declared that a flavonol glucoside extracted by them from buckwheat possesses vitamin P-like properties. It decreased the fragility of capillaries. They called it Rutin. Considerable literature has accumulated about Rutin during the last two years. In its structure Rutin is very close indeed to some of the flavone glucosides present in citrus fruit. It belongs to the group of quercitrin-like substances.

Soon it became apparent that Rutin might be of some help in high blood pressure. It improves the function of small blood vessels, the capillaries, by decreasing their fragility. In other words the danger which is so often present in high blood pressure patients, the danger of "breakage" of small blood vessels in the brain or heart might be prevented, by the use of Rutin. In many leading clinics such as the Mayo Clinic Rutin was tested on numerous patients. The results of these investigations were, however, only moderately encouraging. Rutin helps but only slightly. Its therapeutic effectiveness is limited. Nevertheless Rutin became a very popular preparation with the medical profession and in spite of the fact that it sold for about $800 a pound, hundreds of thousands of pounds are being consumed in this country alone. For there is no other preparation of vitamin P on the market which is sufficiently purified and standardized.

Rutin is a challenge to citrus vitamin P production. For in spite of ten years of intensive investigation in this direction no satisfactory, potent and uniform vitamin P product has been prepared from citrus waste.

The discovery of Rutin, but even more so the extraction of another substance, called Catechin, posed a serious problem to the citrus investigators. Both of these vitamin P-like substances give quite different chemical and biological reactions from that of citrus vitamin P factors. Catechin in particular seems to act in a manner foreign to citrus vitamin P and to produce reac-

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tions which are not characteristic of citrus flavones glucosides. Catechin, which was discovered by the French scientist Jean Lavollay, is a powerful drug, effective in very small doses. By its action it does not look like a vitamin. And still it is able to "relax" the small blood vessels according to Lavollay and his associates, and for this reason is being placed in the group of vitamin P-like substances.

Because Catechin reacts so differently from the original vitamin P of Szent-Gyorgyi the question of testing became of prime importance, and many laboratories in this country are giving all their attention and concentrating all their efforts on elaborating a reliable test for vitamin P .

How To Test Vitamin P

As is usual with many vitamins two types of tests must be applied in order to prove or disprove the presence and the potency of vitamin P: a chemical test and what is known as a biological test—a test on animals. Three chemical tests are being used for vitamin P detection: cyanidin reaction, Wilson's test (boric acid) and Lorenz's method (alkali boiling). When all these three chemical tests are used on the same material, as is being done in this laboratory, one can be quite sure of the results of the investigation. But the question of a biological test is not so simple. Here a heated discussion is still going on among scientists as to the preference and the reliability of the type of test for vitamin P.

The British authors (Scarborough and others) test vitamin P material on guinea pigs as well as humans. They measure the capillary resistance of the animal or man by applying the so-called "negative pressure method" (Bacharach). They take the measurement before giving the vitamin P preparation to the animal and after several days of treatment. They claim that this method is quite reliable and the potency of the preparation can be estimated with considerable accuracy.

The scientists at the University of Southern California, George Majovsky and A. Lesser have introduced quite an ingenious method for testing vitamin P.

They take a mouse. They place the animal in a special glass flask. They decrease the atmospheric pressure in the flask suddenly and the mouse dies from a lung hemorrhage, from the "breakage" of the small blood vessels in the lungs and the consequent bleeding. But if they feed the mouse a vitamin P material before such exposure to the drop of atmospheric pressure the mouse remains alive. It has no bleeding from the blood vessels of the lungs, the blood vessels withstand this sudden change in atmospheric pressure. In other words the resistance of the small blood vessels of the mouse is increased due to the administration of vitamin P. They are less fragile than they are in a normal mouse. If however the material given to the mouse before the exposure does not produce the beneficial effect and the mouse dies from bleeding, then this indicates that the material contains very little or no vitamin P. This method is not very precise. Yet this method gives very satisfactory results when used in conjunction with a chemical testing of the material.

More recently Dr. William Clark and others of the Scripps Metabolic Clinic in San Diego, California, introduced a new biological method for testing vitamin P. They produce a "relaxation", to use a layman's word, or vaso-dilation of the capillaries of white rats by applying the vitamin P product directly to the blood vessel. Although this method has attracted considerable attention among the workers in the field of vitamin P, it can hardly be considered as satisfactory for vitamin P testing. For this method gives positive results only with Catechins. Neither Rutin nor any of the citrus vitamin P factors produced any effect. They were inert. Catechins however were active even when taken in an infinitesimal dose. They acted like a powerful drug on the capillaries. They produced a "relaxation" (vaso-dilation) of the capillaries. But the question might be asked, as is asked by many workers, whether we should consider Catechins as a vitamin? And why should we call Catechin a vitamin P-like substance? Is it not another powerful drug, among several others, which can produce a strong, what we call, vaso-motor response? The fundamental law about vitamins, any and all of them, is that they act slowly, through metabolic processes, playing an important part in the general processes of assimilation in the organism. They cannot act immediately as many drugs act. Therefore only a biological test on vitamin P can be considered satisfactory which proves that the material when taken over a period of time is able to increase the resistance of capillaries and to decrease their fragility. A test which produces a strong local reaction is not acceptable for this purpose.

Fragility and Permeability of Capillaries

President Roosevelt died from a brain hemorrhage. Although we do not know the exact nature of his hemorrhage we may assume that some small vessel had a "leakage" and a profuse bleeding occurred. In his case, as in a majority of similar cases of brain hemorrhage or 'strike.' Roosevelt's death was the result of an increased fragility of the small blood vessels. The term fragility of the blood vessels is being used to designate a decreased resistance on the part of the wall of the blood vessels to blood pressure. A newborn baby or an infant, if healthy, has the highest degree of resistance of the blood vessels. The fragility is nil, generally speaking. With age the fragility of blood vessels and capillaries slowly but steadily increases. Some persons show a higher degree of fragility while others retain till an advanced age considerable "resistance" of their blood vessels. However one must understand that a normal increase of fragility does not indicate any danger to the person. The danger appears only when the walls of the blood vessels are confronted with a higher blood pressure. Then the blood vessels may not be able to withstand a too high pressure and the "breakage" of the wall might occur and bleeding, often dangerous, takes place.

The fragility of blood vessels is a fundamental question of human health, a basic problem of medical science. No wonder that medical scientists are paying so much attention to this question and are so eager to find a remedy or develop a treatment which would increase the resistance of blood vessels.

Among the blood vessels, the capillaries, the smallest arteries, play the important role in our circulatory system. Their normal functioning is of the greatest importance to our health and well being. For if they work properly they are able to regulate better our pressure and to prevent its abnormal increase. Actually it is in the capillaries that the essential business of the circulatory system is carried on. And it is here in the domain of the capillary system that the role of vitamin P factors is of prime importance.

It is through the capillary walls that water and oxygen and other nutritive substances pass into tissue fluids. Normally functioning capillaries do not permit any large molecules such as that of protein to

go through the wall and to penetrate into the tissue fluid. For they work as a kind of "sieve" filtering only those substances which are well dissolved in plasma. When, however, the capillaries become fragile and are unable to resist the pressure from the blood flow then this perfect mechanism of "selective filtration" is disturbed and troubles may occur in the circulatory system. Once the capillaries become fragile, red blood cells penetrate their walls, causing bleeding. Thus, technically speaking, on the basis of the increased fragility of capillaries lies the changes in their permeability. And it seems that vitamin P, as Szent-Gyorgyi first postulated, regulates and controls the normal permeability of the capillary wall and for this reason it is called vitamin P or Permeability vitamin. Actually the fragility of capillaries is closely associated with their disturbed permeability although the exact mechanism of this phenomenon is not as yet sufficiently known.

The role, the function of vitamin P in the human body might better be understood in the light of its normal, may we say, natural activity in plants. Here vitamin P represented by the group of glucosides, acts in a similar if not identical manner. In both cases it controls the flow of nutritive substances through the circulatory system, often remaining inactive and becoming active only when there is an urgent need for its assistance. The chemical nature of its action is not yet clear, but it is generally assumed that it acts in an enzymelike manner.

The Cause of High Blood Pressure

For more than a century the medical profession has believed that hypertension, what the layman knows as high blood pressure, is caused by hardening of the arteries. Arteriosclerosis was blamed for this dread condition which is so prevalent among American business men.

In the middle of the last century a British physician named Bright postulated that the origin of hypertension lay in kidney malfunction. This concept remained in favor for only two decades, until Gull and Sutton offered a new and entirely contradictory explanation of the cause of high blood pressure. It is the hardening of the capillaries, they stated, that produces hypertension. This theory received wide acceptance among the medical profession and remained in force until recently. Only in 1934 Dr. H. Goldblatt and after him Dr. Irwin Page of Indianapolis have demonstrated by dramatic experiments on dogs and other animals that the real cause of hypertension lies in the kidney. By reducing the flow of blood to the kidney these scientists were able to produce a rise of blood pressure as high as 280. Dogs with kidneys receiving a poor supply of blood remain "hypertensive" as long as their capillaries are what we call "ischemic". It is now generally accepted that essential hypertension, the condition where there is an abnormally high blood pressure, is the result of damage to the capillaries of the kidneys, due to the fragility and poor permeability of these small arteries. Why does an injury to the kidney which cannot even be detected by urinalysis, produce high blood pressure? This question is still under discussion and investigation. Dr. Page and others suggested that there is in the kidneys of a hypertensive person an overproduction of some substance known as renin which, when it reaches the blood stream, is transformed into another substance called "angiotonin". It is angiotonin which has the peculiar property of contracting the small blood vessels and capillaries thus inducing the rise in blood pressure.

How to improve the function of the small blood vessels and capillaries of the kidney of persons suffering from hypertension is the medical problem of today. If only we could restore the normal supply of blood to the kidneys, if we could elaborate a practical and effective method in this direction the problem of high blood pressure might be solved forever. And the rice diet which is advocated by Dr. W. Kempner of Duke University, the report on which was first published in 1945 in the North Carolina Medical Journal, is nothing but a rational method to improve the function of the capillaries of the kidney. By eliminating from the diet of the persons affected with high blood pressure those substances which impose a heavy burden upon the capillaries, Dr. Kempner's method is able to help in many cases of essential hypertension. This method relieves the symptoms but is not a real cure. It is not a solution for this important problem of medical science. And that explains why the medical profession is so much interested in vitamin P, the vitamin which is claimed as the one which controls and improves the permeability of capillaries and which reduces their fragility.

Theoretically speaking, if vitamin

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P is what Dr. Szent-Gyorgyi and other scientists have postulated it is, then this substance should not only improve the function of peripheral capillaries, but what is even more important, restore the normal activity of the capillaries of the kidney and thus give us a potent method to combat high blood pressure.

Clinical Evidence

There is considerable evidence to support the medicinal properties of vitamin P factors present in citrus fruit. And yet due to the fact that no potent preparation extracted from citrus fruit is as yet on the market this evidence is rather indicative than conclusive. Numerous authors have demonstrated that when an animal or man has what we call "hemorrhagic diathesis", or a tendency to bleed easily due to fragility of the capillaries, vitamin P is beneficial and can clear up this condition. Armentato, Lajos, Scarborough and Stewart, Franke, Gorrie, Jersild and many others have treated their patients with vitamin P products of various potency and claimed quite satisfactory results. In diabetes when persons have, due to a toxic condition, a strongly pronounced tendency to bleed easily and where the capillaries show great fragility, vitamin P seems to be of unquestionable value (Rudy, Beaser and Selligman). When numerous dark red spots appear on the skin, a condition known as purpora hemorrhagica, vitamin P is able to cure this condition according to Scarborough and Stewart of Edinburgh, and others (Newton, Kugelmass, Chirey, Lavollay, Maschas). The most dramatic development in the clinical investigations on vitamin P was the information that this vitamin is beneficial in rheumatic fever. Why should this substance have a therapeutic effect upon such a disease which is often regarded as of infectious origin? Dr. J. Rinehart, of the University of California Medical School, who treated a number of patients affected with rheumatic fever, gives a plausible explanation. It seems that in some infectious diseases there is an increased permeability of the capillaries. Their fragility is high. And this abnormality of the capillary function seems to be closely associated with allergy, a condition of hypersensitiveness to some proteins. Many doctors believe that in rheumatic fever allergic factors play an important if not a primary role. It is from this viewpoint that Dr. Rinehart decided to attack this disease by improving the capillary system. His conclusions are that vitamin P is of considerable help in this condition, as an additional therapy. Dr. Rinehart's observations were confirmed by many other physicians (Ludwig, Montgomery, Kaether, and Slany). In connection with this study much attention is now being given to the beneficial effects of vitamin P in allergic conditions in general. Drs. Goldfarb and Stolman reported that vitamin P products greatly reduce the toxic effect of arsenic preparations. **If further evidence will give new proofs that vitamin P is able to decrease allergic reactions, that it renders the allergic persons less sensitive, then the consumption of citrus fruit, as a rich source of vitamin P, might be considerably increased.**

But the attention of the medical profession is centered primarily on the role which vitamin P might play in the treatment of hypertension. A number of authors have reported that some vitamin P products are able to reduce high blood pressure (Armentato, Majovsky, Decker). But the absence of any potent preparation of vitamin P handicaps any extensive clinical investigations.

Briefly summarizing the clinical evidence on vitamin P we may say that there is not a "clearcut" evidence as in the case of penicillin or similar drugs. The clinical evidence of any vitamin is never dramatic, never impressive. For vitamins not only work slowly through general metabolic processes as was said, but always in close cooperation with many other essential substances. And yet the existing clinical evidence is sufficiently convincing to believe in the therapeutic properties of vitamin P in many conditions when the capillary system is affected. It is in connection with these curative properties of vitamin P that we would like to stress the fact that citrus fruit is a very rich source of vitamin P. As long as no pharmaceutical preparation is available we should give more thought, **pay more attention to the fact that there exists an inexhaustible natural source of vitamin P in citrus fruit.**

Citrus Fruit a Rich Source of Vitamin P

A Florida physician who specializes in the treatment of hypertension spent years looking and searching for new remedies for this condition. He tried every new method, every preparation which offered even a slight hope of relief to hypertensive patients. When Dr. Kempner reported about his rice diet, this physician was the first to submit his patients to this regime. In some cases the results were satisfactory. In others the treatment was a failure. When he read about the vitamin P discovery he decided to try this vitamin on his patients. Unable to procure any substantial amount of vitamin P product for his clinical investigations he asked himself: Why not give my patients a large quantity of citrus fruit? The idea appeared logical to him. And yet he was unable to find any reference to this subject in the voluminous bibliography on vitamin P. He prescribed a rice diet for his patients supplemented by a good dose of fresh oranges. They ate from six to eight oranges a day. This regime continued for several weeks with, as the doctor told me, "very encouraging results." He is reluctant to make any conclusions. He considers his clinical investigations only a preliminary step to a large scale clinical study. In one particular case, that of a retired army officer who had as high as 280 systolic and 160 diastolic pressure, this combined diet brought the pressure down to 150/90 and it has remained there for a considerable length of time. The patient, of course, was not cured Perhaps the improvement was only temporary and due more to the rice diet than to citrus fruit therapy. Nevertheless, as the doctor pointed out to me, the question of the therapeutic value of large quantities of citrus fruits or fresh citrus juice in cases of capillary fragility should be thoroughly investigated by the profession.

Some of the investigations conducted by such responsible scientists as Dr. H. Scarborough of the Royal Hospital in Edinburgh (1946) and Bacharach and Coates (1943), confirm the beneficial effect of food rich in vitamin P on capillary fragility. Using biological tests on animals and man they have proved that such a diet increases capillary resistance to a considerable degree.

According to Scarborough the dose of vitamin P which might prevent the increase of capillary fragility is only 300 units, or three milligrams of vitamin P. He calls it a "minimum daily protective dose". But when capillary fragility is already present and of considerable gravity, then a much higher dose is recommended according to other authors (Szent-Gyorgyi, Kugelmass, Hillstrung). A dose which might be called "curative" is as high as 50 to 100 milligrams of vitamin P per day. How many oranges and grapefruit must one consume to obtain such an amount of vitamin P per day? Scarborough, who examined the vitamin

P potency of various fruits gives the following figures (per 100 grams of weight):

Lemon:	Whole fruit	500 units
	Juice (fresh)	500-700 units
Orange:	whole fruit	300-500 units
	Juice (fresh)	300-500 units
Grapefruit:	Whole fruit	100 units

Thus two oranges or two grapefruit might give the "protective" or "preventive" dose, while it is necessary to consume at least eight oranges or grapefruit a day to receive the "curative" dose of vitamin P. The presence of vitamin C, which works as a co-factor with vitamin P, gives an additional value to fresh citrus fruit over any pharmaceutical preparation.

Middle Aged Man Must Eat Citrus Fruit

There is a scientific axiom to which all of us agree only too willingly. It is much easier to prevent the chronic diseases of middle age than to treat them. When any chronic disease such as arthritis, hypertension or arteriosclerosis get a firm foot-hold on the human organism, the physician can do practically nothing to arrest the progress of the illness. But in the field of preventive medicine there are many more possibilities and a much greater degree of success can be achieved.

There are some facts the reality of which we must face. While the capillary resistance of an infant is as high as 500 mm. mercury, the capillary resistance of a middle age man is often below 100 mm. mercury. In about 65% of males, blood pressure tends to rise considerably with age. In other words, generally speaking the population can be divided into two almost equal parts. One which gradually becomes hypertensive with age and which, at the age of fifty or less have a relatively high blood pressure, and the minority, which might reach old age retaining a normal or almost normal pressure. But even when the blood pressure is only slightly high the question of capillary fragility is of the utmost importance. The capillaries and small blood vessels must be kept in good condition if we want to prevent any further aggravation in the circulatory system. This fundamental fact of human physiology is often overlooked or disregarded, for we are not as yet sufficiently aware of the priceless value of preventive measures.

Whatever the chemical nature of vitamin P is, there is no question that citrus fruit contains vitamin P factors of therapeutic value for the prevention and improvement of capillary fragility. And while the "curative" use of citrus fruit requires an extensive clinical investigation, **the consumption of fruit or fresh fruit juice as a preventive measure is strongly recommended.** It is recommended to any man or woman who is approaching the age of forty and who has, although it might not be recognized clinically, the first signs of capillary fragility, a condition which might lead to serious complications. **The value of citrus fruit is not only in vitamin C. It lies much more in its vitamin P content, a vitamin which is of considerable importance as a preventive factor in the physical deterioration of middle aged.**

New Advertising Manager For The Citrus Commission

The Florida Citrus Commission has appointed Dawson Newton, Miami, as advertising manager, filling the vacancy caused by the recent resignation of Don A. Butts.

The action was taken at the annual organization meeting of the Commission, at which Rollie Tillman, Lake Wales, was reelected chairman and J. B. Prevatt, Tavares, was reelected vice chairman.

Newton, who has been advertising manager of the Ronrico Corporation in Miami, has had wide advertising experience with publications in New York, Los Angeles and Tulsa, Okla., and also formerly operated his own advertising research agency. He is a Navy veteran of World War II.

Commission Chairman Tillman reappointed Prevatt chairman of the advertising committee, R .A. Fender of Orlando chairman of the research committee, and W. E. Bishop, Citra, chairman of the budget committee.

The Commission voted to participate in the national railway exposition in Chicago July 20-Oct. 31, by spending up to $8,200 toward providing citrus trees for landscaping the Florida area of the fair grounds and setting up a citrus juice bar.

On recommendations of General Manager Marvin H. Walker, the Commission approved appointment of Charles Dibbens, London, to make an immediate survey of export possibilities for citrus in Europe, where he has had wide contacts for many years.

The Commission re-affirmed its recent action in requesting the U.S. Department of Agriculture to rewrite fresh fruit grades applicable to Florida citrus, after some industry factors asked for it to reconsider a proposed internal quality test of 9 per cent solids for oranges.

In order to give opponents further opportunity to present their views on the grade proposals, the Commission voted to request the USDA to hold a hearing in Florida before making a decision on the revised standards.

Citrus growers are seeking ways of reducing production costs.

RESISTANCE OF PONCIRUS TRIFOLIATA ROOTSTOCK TO NEMATODE INFESTATION IN ARGENTINA

(Continued from page 9)

any relationship to the infestation on the stock. Other stocks examined and found heavily infested included Rangpur lime, Lima de Persia (sweet lime), grapefruit, common Mandarin and the common lime called lima sutil.

In view of Suit's report of the association of nematodes with the slow decline of citrus in Florida and increasing reports of damage by nematodes on citrus in California this information may be of some value in connection with citrus stock experiment. Experiments are being carried on to determine whether hybrids between P. trifoliata and other types of citrus will carry over some of the resistance as some of these may be better stocks from other standpoints than **P. trifoliata.**

Degree of Infestation of the Common Citrus Rootstocks by the Citrus Nematode (Tylenchulus semipenetrans) in Argentina

Rootstock	Tot. Trees Exam.	Total Infested	Degree of Infestation				
			Light	Mod.	Heavy	None	% Infested
Sour Orange	141	124	63	36	25	17	88
Sweet Orange	63	58	22	15	21	5	92
Rough Lemon	31	27	4	4	19	4	87
Poncirus Trifoliata	59	20*	20*	0	0	39	34*

*—Males only found

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Reports Of Our Field Men . . .

POLK COUNTY
J. M. (Jim) Sample

As of this writing, June 15th, it is still very dry in many parts of central Polk County, with trees wilting and some young fruit dropping. There will likely be some late bloom on these dry groves when rains do start. A great deal of irrigation is being done and oil spraying has started on watered groves or in sections getting rain. The purple scale population is heavy and serious in many groves, along with mealybug and an increase in rust mites. The new fruit crop appears to be unusually free from melanose. Very little pruning is planned for the summer. In fact, all growers are strongly inclined to reduce all possible productions operations during the remainder of the year in view of the low returns received this season. We have not moved all of the fruit from this territory, and the entire crop will not be moved.

SOUTHWEST FLORIDA
Eaves Allison

Rainfall has been very spotty in this territory for the last month with many groves suffering badly for water. There has been a great deal of foliage curling and wilting over a wide area. A good rain at this writing, June 15th, seems to have broken the drought and will no doubt save much fruit and many trees. Most groves have had their summer fertilizer application, but a few growers are waiting until they have finished moving the balance of their fruit. The vegatable and flower deal in this area is over until fall. Many growers have taken advantage of the dry weather to clear up their new land and burn trash preparatory to getting ready for fall plantings.

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

Conditions in my territory are similar to the general depressed attitude of the citrus growers throughout the state. The valencias will be moved within the next two weeks, and they are badly dried up at this time. A considerable tonnage of grapefruit will never be picked from the trees because of the low prices. Most growers are hoping that the Mutual Coop will be the answer to their problems. We have rain in some spots throughout the territory. which has helped a lot, but we are still in need of general rains. There is a fair crop of new fruit set, with grapefruit looking better than we made our last report. We have cut our fertilizer tonnage on all varieties and in many cases grapefruit were not given any fertilizer. Vegatable growers have had a good season with good yield and good prices. There was a good crop of watermelons, but some localities had extremely bad luck because they were unable to control disease infestations.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

As if low prices were not enough to discourage the best of growers, we are now having one of the most severe droughts that we have had in a number of years. There will be a large number of groves that will shed their new crop of fruit, but will probably bloom again when we start getting plenty of rain. Most of the oranges have been moved from this section. but those that have not been picked are now soft and will probably never be moved to market. There will be a considerable tonnage of grapefruit that will never be picked. We know of several instances where the grove owner has turned over his grapefruit crop to employees to salvage whatever they can from the crop. This was done to help the employees and to get the fruit removed from the trees. It is needless to say that most growers in this section are up-set and wondering what to look forward to for the coming year.

HILLSBOROUGH & PINELLAS COUNTIES
C. S. (Charlie) Little

At the time of this writing we are still very dry in this territory. Some sections have been lucky in having received a little rain but a large percentge of the groves are still in a wilt. We were very fortunate that we had an early bloom and the fruit had set and started growing before the drought became so severe. Therefore I don't think this dry spell will affect the coming crop to any appreciable extent unless the trees put on a heavy late bloom at a result of the drought shock. We have a good crop of new fruit on all trees with the exception of valencia oranges. Some blocks of duncan grapefruit that did not have the fruit moved until late are not setting a very heavy crop of fruit for the coming season. Most packing houses are making every effort to close for the season, but at this time it looks as if most of them will be operating well up into July. With low prices we can see evidence of over economizing in the care of groves. Fertilizer has not been applied as it should have been, spraying is being done to a lessor degree than required and even irrigation is being neglected where it could be of great advantage.

SOUTH POLK, HIGHLANDS & HARDEE COUNTIES
R. L. (Bob) Padgett

This territory has had some good rains in the last few days and relieved a lot of growers of the expensive task of irrigating. West Hardee County suffered more from dry weather than in any other section of this territory with not much moisture in that area as of this writing. The vegetable deal in Hardee County this spring was a success with most growers making money. Tomatoes were the big crop and with good yield and good prices practically every grower made some money. All other vegetable crops brought good money and as a result the entire County is in a prosperous condition. Scale insects are bad, in fact they are worse than they have been in this section for many years and most growers are very busy with oil sprays. Rust mites have been bad all spring and summer and it has been a continous fight to keep the pest under control. Our summer application of fertilizer is just about over, and while there has been a tendency on the part of the grower to economize, we still have been successful in getting a sufficient poundage applied by our customers to maintain the health of the trees.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Our travels has brought us a lot of talk about how tough the citrus market has been this season . . . and since this condition affects everyone in peninsular Florida we started askin' leaders in the industry about the situation . . . we don't mean paid organizers. The folks we talked to was lookin' after groves or else they was growers themselves . . . and after talkin' to 'em we're right much encouraged. Seems like everybody is ready to do sumpin to help make conditions better. They is a large number of folks who has hooked their aim to a certain solution and a lot who hasn't, but at least they're all in the mood to do some cooperatin' with their neighbors to git sumpin' done that'll help the situation durin' the comin' season.

Right now there is a big move on foot to git the growers in Florida interested in joinin' a statewide Mutual Cooperative. Lately this organization has been put into the hands of the growers. For many years past the growers hasn't had much to say about the marketin' of their fruit, but now they've got a chance to git in the swim and have a voice in marketin' their fruit . . . and it is to be hoped that they join hands to see if sumpin' can't be done to better the situation. The opportunity is now placed in their hands and if they fall down on the job they can't complain about outside interests bein' the dominatin' factor in fruit prices.

We know that some growers feel that this coop. plan will be of advantage to only a chosen few . . . we don't think so . . . while in its original state it may not cure all the sickness in the industry it can be revised and revamped until it does provide the answer that we've got to have to make this business of growin' citrus fruit profitable.

We'd like to ask that all citrus growers in Florida git behind this move. Jist look back over the last two years and take stock of what has been done in marketin' our citrus crop. Things has been bad, and they'll git worse if we don't git busy and work together. Even if the plan ain't plumb perfect the first year it will mark the beginnin' of an effort which should result in a suitable profit fer the growers and will enable us to care fer our families and save the industry itself. We urge you to think it over.

Uncle Bill

C. O. Bratley Succumbs To Heart Attack

Dr. C. O. Bratley, Assistant to the Administrator of the Research and Marketing Act and one of the nation's outstanding fruit and vegetable pathologists, died of a heart attack at Suburban Hospital, Bethesda, Md., at 4 o'clock May 9. Funeral services were held at the Chevy Chase Presbyterian Church.

Prior to his transfer in August 1947 to assist in the administration of the Research and Marketing Act, Dr. Bratley for 15 years had been with the Bureau of Plant Industry, Soils, and Agricultural Engineering in charge of the New York City Laboratory for handling transportation, storage and disease investigations of fruits and vegetables. Administrator E. A. Meyer paid highest tribute to Dr. Bratley and stated that because of his profound knowledge as a scientist and his ability as an administrator his untimely death is a serious loss to the Department.

Dr. Bratley was born at Wichita, Kansas on September 1, 1903. He graduated from the University of Florida in 1925 and later earned his Doctor's degree in plant pathology from Cornell. He was a Fellow of the American Association for the Advancement of Science, a member of the American Phytopathological Society, the American Society for Horticultural Science, and the American Society of Refrigeration Engineers.

THE COMPLETE UTILIZATION OF CITRUS CROPS

(Continued from page 4)

yeasts (which may be returned to feed manufacture) and then determine whether available domestic sewage facilities will handle the volume to be disposed of. If they will not, the alternative is to dilute it (after fermentation and desludging) with the cooling condensing water and dispose of it through a stream, or estuary which provides for continuing mixing, dilution and flow. In three applications of this procedure there has never been observed the killing of fish nor the creation of a nuisance. It cannot, however, be allowed to flow into a lake with no outlet, because gradual accumulation will cause trouble, unless the lake is sufficiently large to oxidize organic substances before trouble results.

Conclusion

In accepting an invitation to discuss Chemurgic and other means for increasing the profitable utlization of citrus crops, your speaker had no delusions that he could contribute anything new, startling or revolutionary, but only the thought that he could emphasize factors apparent to technical men, and stress the importance of keeping emphasis upon the word "profitable."

Whether a new development is profitable or not depends upon many factors. Not only must it be inherently competitive, but products must be developed and marketed constructively. Whether chlorine gas is a poisonous war gas or a safeguard of public health depends upon the use. Whether atomic energy provides death or destruction or implements our supply of energy and research and medical resources depends upon the men who control it.

Citrus growers will be doomed to disappointment if they hope for some laboratory magic to insure a profit on all citrus crops. Citrus juice canning makes it possible to provide the public with the food value of citrus fruits at any time of year in convenient, economical form to use. It is a useful tool, but like any tool, it may not be used to the best advantage of growers unless they are organized to adequately represent their important function in supplying the raw material.

To insure improvement in the market situation it is probable that growers of all areas will have to consider every aspect of the utilization and marketing of citrus crops and then act effectively. The promotion of consumption will require top promotional talents and facilities, unhampered by crippling restrictions.

While the outlook for grapefruit challenges all the ingenuity that can be applied, the prospect is that with reasonable skill and diligence, the demand for oranges may be raised to a point which will equal or surpass the supply, within a few years.

Then the reasonable supposition is that planting will again boom and the problem of increasing consumption will be back on the growers' doorstep in magnified form.

Spuds Johnson says it's not so bad when a man has a little money as it is when a little money has a man.

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WANTED—for our files, copy of Volume 2, Number 8 (August 1921) of The Citrus Industry Magazine. Anyone having a copy of this issue please mail to or advise Miss Eunice Weiderhold, Librarian, Citrus Experiment Station, Lake Alfred, Florida.

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OBSERVATIONS ON COVER CROPS IN THE CITRUS PROGRAM

(Continued from Page 7)

valuable, for this reason, in maintaining conditions favorable for the growth of friendly fungi—and I might add, snails, for those of you who are interested in them.

Cover crops help to eliminate moisture during the periods of excessive rainfall. They act as pumps to pump the water out of the soil.

Last year, I had an occasion to observe this very graphically. I visited some groves in DeSoto County and in one particular grove a grower had begun to cultivate when the rains ran him out. At the time I was there the trees in the area that had no cover crop were visibly damaged while those that had cover crops were not.

These are some of the reasons that explain why it has been the experience of many successful growers that citrus trees do best, that is, make the best growth, look more healthy, produce better fruit and in general have a much better appearance, when grown on soils well supplied with humus. On the other hand very little of your light pine land contains a sufficient amount of humus for the best growth of citrus trees.

Humus contains from 3 to 12% of nitrogen and this in itself is a fact worth bearing in mind, but it has been found besides this, soils rich in humus are usually well supplied with phosphoric acid and potash.

In addition to the humus that the cover crop may add to the soil, it also adds plant food. The legume crops, of course, add more plant food than do the non-legumes. It is believed that the amount of nitrogen in the fertilizer may be reduced one, two or even three per cent when a good legume cover crop is returned to the soil each year. This reduction of course depends on the type cover crop, the yield and the weather conditions.

Take, for instance, hairy indigo, a comparatively new and very promising cover crop for citrus. This plant will, we are told by our agronomy department, yield 15,000 to 30,000 pounds green weight per acre per year. This in turn will, if plowed under as a green manure, yield some 100 to 150 pounds of nitrogen, 50 pounds phosphoric acid and about 100 pounds of potash. A big percent of this nitrogen comes from the air and is a gift deposited in the soil by the plant. It will compare favorably with, but is slightly slower acting than such chemicals as urimon, sulphate of ammonia, liquid nitrogen and others.

The phosphoric acid and potash is adsorbed, from the soil, by the roots of the cover crop and although it is believed some of this material comes from a source that is normally unavailable to the citrus tree, it is reasonable to believe that these two elements will eventually have to be resupplied to the soil through commercial applications. Granting that it does, we have gained a goodly supply of free nitrogen and at the same time have caused the soil to increase in organic content which, as already stated, is a highly desirable condition. Doesn't this mean something to you, or, are you like the grower down the state who had an excellent cover crop of crotolarea each year; he kept piling on the commercial fertilizer until finally his packing house sent him word that he would have to get rid of that crotolarea or they would stop taking his fruit. After discussing the matter with his county agent they decided to keep the crotolarea; and reduce the fertilizer, and I am told the packing house had no complaint against the fruit.

Up to this point I haven't mentioned pumpkin bugs, poor quality fruit, die back, release of nitrogen at the wrong time of the year, low solids fruits and many of the commonly heard objections to the use of cover crops and especially to legume cover crops. All I can say in this regard is that "if the mountain won't come to us maybe we had better figure out how to get to it." In this connection it might be well to tell you something of a practice that is being carried on in some parts of the state. In groves where the canopy of the trees are overlapping, it has been found that poor results are obtained from the use of speed sprayers. So the practice of skirting and hedging the trees is being used. This is done by the use of a step ladder and a good pair of pruning shears. The branches are trimmed back or "hedged up" until there is an opening or isle between each tree row. Generally, this is done on only opposite sides of the tree and it will apparently last for a period of some three or four years, depending on the type job done.

I think you all know what I mean by skirting the tree—merely removing some of the lowest scaffold limbs to allow for better cultivation and areation. Incidentally, we feel it will materially reduce foot rot. These practices are not only beneficial from the standpoint of getting better spray coverage but they also open an avenue for sunlight and cover crops. I am told the practice is relatively inexpensive and has no apparent effect on the initial or subsequent crop yield.

We now have insecticides that will kill pumpkin bugs. Die back, usually, comes from too much nitrogen. Cut down on your commercial application. Do not use legumes in early maturing varieties, or if you do, try to arrange the plowing under so as not to release the nitrogen at a critical time.

Up to now I haven't mentioned winter cover crops because in general winter cover crops are not recommended for citrus groves because of several reasons. Two of which are:

First, they are a cold hazard—in some groves they tend to cut down air drainage, causing cold spots that result in cold damage or even freezing;

Second, They compete for moisture during a time that rainfall is short and moisture is critical.

In conclusion I say again if we are to weather the immediate crisis we must reduce our cost of operation and I suggest to you that a more wise and extensive use of cover crops, especially legumes on young groves, might be a means through which many of us can do the job.

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